U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
NEW YORK CONSERVATION PRACTICE GUIDELINE

ROOF RUNOFF STRUCTURE

(NUMBER)

CODE NY558

REFERENCE

National Handbook of Conservation Practices – Standard Code NY558

Commonly Associated Practices or Processes

The following conservation practices are commonly used in conjunction with this practice to address natural resource concerns and opportunities in New York. This does not imply that any or all of the listed practices must be included or that others may not be included in a conservation management system (CMS). Consult Section III of the Field Office Technical Guide for assistance in developing CMS.

To determine whether a National or New York Conservation Standard applies to this and any other associated practices, check the following website: www.ny.nrcs.usda.gov. Click on the Technical Resources button, and look in the left-hand column for "eFOTG" on the next screen. Next, click on the "eFOTG" link, and look for the Conservation Standards in Section IV.

Table A: Commonly Associated Processes or Practices

Number	Name	Job/Engineering Sheets
382	Fence	
NY393a	Filter Strip — Area	
412	Grassed Waterway	NY ENG 24 and 25, and/or 24A and 25A
468	Lined Waterway or Outlet	
561	Heavy Use Area Protection	
606	Subsurface Drain	NY ENG 28 and 29
607	Surface Drain – Field Ditch	
614	Watering Facility	
620	Underground Outlet	
638	Water and Sediment Control Basin	
NY707	Barnyard Water Management System	

Other References:

Engineering Field Handbook – Chapter 2 – Estimating Runoff and Peak Discharges, Chapter 3 – Hydraulics, Chapter 14 – Drainage

New York State Drainage Guide, September 1987

Agricultural Waste Management Field Handbook – Chapter 10 – Pages 10-1-10-4

Current Soil Survey Data.

CULTURAL RESOURCES

Cultural resource reviews will be conducted for all ground disturbing practices, components, or other activities, as per the State Level Agreement between NRCS and the New York State Historic Preservation Officer.

PERMITS AND NOTIFICATIONS

All permits, easements, and rights-of-way are the responsibility of the landowner. **Dig Safely NY** (formerly the Underground Facilities Protection Organization, or UFPO) and non-member local utilities will be contacted according to the time required before construction to mark all applicable facilities in the construction area. This is the responsibility of the excavator.

Identification and the location of all other farmstead underground or overhead facilities is the responsibility of the landowner.

INVENTORY AND EVALUATION

1. Determine best method of controlling roof water runoff; such as roof gutters, drip trenches, and/or surface channels.
2. Consider the collection of runoff from roof areas for potable and non-potable uses. For potable uses, establish a water monitoring and testing program.
3. Determine the impact of livestock, farm operations, farm equipment, snow and ice near the planned structure(s). Plan measures to protect the installed practices such as fencing, curbs, berms, downspout protection, debris guards, snow and ice guards, etc.
4. Locate a suitable outlet(s) considering management, stability, safety, and property rights.
5. Determine how disruptive the installation will be to the existing barnyard.
6. If roof gutters are to be considered, determine condition of fascia board and rafter tails (if applicable). Replace if needed.
7. Have detailed map or sketch of farmstead, showing location of all buildings, barnyards, roads, and surface and ground water sources. Include the roof and building dimensions for the contributing area. Show locations of any underground and/or overhead farmstead utilities. Photographs taken at the site may also be helpful during the planning and design process.

DESIGN PROCEDURE

All Cases:

1. Determine the width and length (dimensions) of roof sections to calculate the total area (in square feet).
2. Calculate peak discharge from each roof area. Refer to Conservation Practice Standard NY 558, Figure 1- 25 Year frequency, 5 minute rainfall (inches) to determine the factor for the design location. With that value refer to Table 1 for the Peak Discharge (cfs/1,000 sq. ft.).

Case A: Roof Gutters:

1. Roof gutters with downspouts are installed at the roof edge as a means to collect and transport roof runoff to a suitable location. The system's capacity is usually limited by the capacity of the downspout. When multiple downspouts are planned at one location, gutter capacity may become the limiting factor.

2. Select the gutter and downspout configuration and size. Calculate downspout Q based on hydraulics. Most downspouts with sharp corners at the junction with the gutter bottom will be orifice control. Refer to EFH Chapter 3 page 3-67 for the formula:

$$Q = Ca \sqrt{2gh}$$

   Note that the C factor is usually 0.6.

3. Determine potential number and locations for the downspouts by calculating the roof area discharge that equals the downspout discharge capacity. Refer to the Practice Standard, NY558, Table 1, for the roof peak discharge (cfs/1000 square feet).
4. If multiple downspouts exist at one location, determine gutter Q (cfs) using Manning's Formula and Flow Continuity equation (EFH Chapter 3, pages 3-20 and 3-15). Gutter grade may be limited to allow for proper positioning of the gutter along the drip edge, by the width of the fascia board and run length.
5. This may be an iterative design process for sizing the gutters and downspouts. Variables to be considered are the gutter size, gutter grade, downspout size and the number of downspout locations.
6. When selecting roof gutter materials, note that dissimilar metals shall not be in contact with each other such as steel roof and aluminum gutters and hangers.
7. Downspouts may be run along the outside and/or the inside of the building to reach a better outlet location. In situations where damage to the downspouts is likely, PVC Schedule 40 pipe, or pipe of a similar or greater strength has been used as the downspout material. Review these options with the landowner.
8. Determine the type of outlet to be designed for the downspout, i.e., an underground outlet, surface ditch, waterway, diversion, water trough, collection tank or direct discharge to the existing ground surface. Refer to applicable Practice Guidelines for design procedures.
9. Consider other design components that would improve or maintain the proper functioning of the roof gutter system, i.e., downspout protection, snow/ice guards, etc.

Case B: Drip Trench:

1. Drip trenches collect water under the drip line of the roof(s), and safely convey the discharge through surface or subsurface flow. These trenches must have berms or curbs to contain the clean water, and be fenced to exclude livestock access.
2. Determine the inflow rate for the drip trench based on the type of drainfill material to be used. Refer to the NYS Drainage Guide, page 54, Soil Texture/Inflow Rate (cfs/1000 linear feet).
3. Consider the transport of excess runoff, when the drainfill may be in a frozen or saturated condition. Install the earthen berm or curb along the outside/lower edge of the drainfill material to insure that runoff is directed to the drainage system.
4. Using the peak discharge from Design Procedure, Step 2 and the minimum pipe grade, determine the type of drainage pipe and size accordingly. Use perforated pipe in the collection trench. Refer to EFH Chapter 14, Figure 14-34, and 14-35, page 14-66, 14-67. Also refer to the NYS Drainage Guide page 43 and 44. Additionally, refer to the practice guideline for Underground Outlet (620).

5. Consider other design components that would improve or maintain the proper functioning of the system, i.e., splash guards, fencing to exclude livestock access, etc.

Case C: Surface Channels:

1. These channels are located beneath the roof drip line as a means to collect and transport roof runoff to another location. Determine channel location and selection of a suitable outlet. The outlet may be a surface ditch, waterway, diversion, underground outlet or existing ground surface. Refer to applicable Practice Guidelines for design procedures.
2. Select the channel material and the appropriate "n" value. Determine the channel size, shape, grade and capacity (Q) using Manning's Formula and the Flow Continuity equation (EFH Chapter 3, pages 3-20 and 3-15).
3. Consider other design components that would improve or maintain the proper functioning of the system, i.e., splashguards, fencing to exclude livestock access, etc.

All Cases (Continued):

3. Compile all design information in appropriate design folder.
4. Develop construction drawings and specifications for roof water management project, locate and describe all public and farmstead utilities in the project area.
5. Compute material quantities, such as excavation, trenching, earth fill, drain fill, roof gutters and downspouts, the type and length of pipe (for each of the designed sizes) and for any other appurtenances.
6. If the selected treatment requires seeding, determine the appropriate seeding for the soil type and rate of flow (Q), if present. Select seeding mixture from Plant Materials Technical Reference #11, "A Guide to Conservation Plantings on Critical Areas". Complete the job seeding requirements on NY-ENG-17, Seeding Grasses and Legumes, or equivalent form(s).
7. Develop a cost estimate, an O & M Plan, and an inspection plan for the project, and review these and the completed construction drawings and specifications with the landowner.
8. A statement requiring the excavator to notify **Dig Safely NY** and non-member utilities for proper utility notification is **REQUIRED** on the drawing. Bear in mind that this type of project often occurs in areas where farm utilities (overhead and underground) are present.
9. Determine your level of Job Approval Authority for the design class of this project, obtain approval from appropriate individual, if not qualified.
10. Assemble a complete final construction package.

PRE CONSTRUCTION ACTIVITIES

1. Provide copies of the construction specifications and drawings to the landowner. Explain all aspects of the job before a contractor is secured. Review the O&M plan with the landowner to assure proper maintenance of the completed practice.

2. Thoroughly review the job with the landowner and contractor prior to construction. Insure that all utilities applicable to the job site have been notified and are marked prior to construction.
3. Schedule the construction start with the landowner and contractor. Coordination of all staking and construction timing with the contractor and landowner can assure an efficient use of manpower. Plan the start of construction such that the completion time will permit optimal establishment of vegetative cover, if required.
4. Mark the trench/channel stations with proposed cuts, set and mark offset grade stakes if needed. Set other markings as needed for appurtenant structures. Note: if animals are present in the barnyard, traditional methods of layout may not be practical.

CONSTRUCTION INSPECTION

Make random construction checks during implementation. The checks should include:

- Roof gutter size, material, thickness, and it's position in relation to the roofline. Inspect gutter hangers to determine that they are the proper type and spaced properly.
- Check downspout location, size, and material. Inspect downspouts to see that they are protected from livestock and equipment operations.
- The location and dimensions of the drip trench or surface channel, berm/curb.
- Surface inlet(s) size and material, orifice size(s), and conduit materials and sizes; and other appurtenances, as required; and,
- Adherence to the design grade, drain fill material, bedding/blinding, and depth/cover; and,
- Elevation for the top of surface inlet(s), orifice plate(s), and maximum head.

During the final construction check, assure that the:

- Installed outlet(s) (as applicable) are stable and free of spoil and debris; and,
- Trench is adequately backfilled to allow for settlement; and,
- Animal guard(s) are properly installed and secured; and,
- Fencing to exclude livestock from collection trench/channel is installed, and,
- Construction spoil and debris are properly disposed of, and,
- Completed earthwork is suitable for seeding establishment and final seeding requirements have been installed in accordance with the seeding plan.

Document the progress of the construction in the Cooperator Assistance Notes (NRCS-CPA-6/6A) or a similar job log. In addition, photographs documenting construction progress are useful, although not required.

FINAL DOCUMENTATION REQUIREMENTS

All properly planned, designed, and installed conservation practices require documentation in the appropriate case file. Documentation must be sufficient to show:

1. The design conforms to the applicable standard;
2. The prepared construction drawings and specifications accurately reflect the design;
3. The installed practice meets the requirements of the construction drawings and specifications; and,
4. The documented drawings are to be marked "As Built", with changes shown in red.

REPORTING

Enter all documentation on the Conservation Plan (NRCS-CPA-68), Conservation Assistance Notes (NRCS-CPA-6/6A) and the contract document (NRCS-LTP-11), if applicable.

Report the practice and applicable components in the NRCS progress reporting system. Be certain to report benefits for all applicable resources and resource concerns as allowed in the NRCS progress reporting system.

OPERATION AND MAINTENANCE

Facilities, structure, and practices must be operated and maintained to ensure proper function and longevity. Periodic follow-up with the landowner is essential to ensure that all operation and maintenance (O&M) requirements are understood and followed.